WE CLAIM

1. A television rating system for targeted program delivery, comprising:

a clustering engine receiving television viewing data input, processing the viewing data input, and generating user profiles targeting advertising category groups;

a client-side system adapted to classify a television user into at least one advertising category group;

a contextual behavioral profiling system connected to said client-side system and determining a television user's viewing behavior with content and usage-related preferences; and

a behavioral model database connected to said profiling system and storing therein information with the television user's viewing behavior.

2. The system according to claim 1, wherein said clustering engine is a software agent residing in a central computer system at a television distribution head-end and is programmed to create template behavioral profiles corresponding to targeted advertising categories of television viewers.

3. The system according to claim 2, wherein said clustering engine is trained substantially exclusively on tagged viewing data from a given target group to learn a most general profile of the given target group.

4. The system according to claim 2, wherein said clustering engine is programmed to generalize viewer's profiles in each group into a representative aggregation for a respective

advertising category, and to form advertising category profiles by aggregating all dimensions most strongly in common for the given group and most unique across target groups.

5. The system according to claim 1, which further comprises an advertisement manager connected to query said behavioral model database, said advertisement manager being programmed to parameterize behavioral profiles of said behavioral model database and to download the parameterized behavioral profiles to an advertising category membership agent residing at said client-side system.

6. The system according to claim 5, wherein said advertising category membership agent is configured to reconstruct the downloaded parameterized targeting models, and apply a clustering engine to the television user's history to determine a most likely advertising category the user belongs to and store the results as targeting category probabilities in a user category database.

7. The system according to claim 5, which further comprises targeting agents and presentation agents disposed at said client-side system for combining the targeting category probabilities and relevant preference information to selectively capture, store, and display advertisements downloaded in accordance with the optimization.

8. In an interactive display system with a head-end side distributing program content and a client side receiving the program content and selectively displaying the program content in accordance with a user's selection, a preference engine for determining the user's preferred program content, comprising:

a user monitoring device connected at the client side to record contextual transition behaviors profiling one or more users and to continually build a knowledgebase of preferences and contextual transition behaviors profiling the one or more users; and

a device for providing to the one or more users the program content in accordance with the user's demographic information and with the contextual transition behavior profile.

9. The preference engine according to claim 8, wherein said user monitoring device models the user's behavioral interaction with advertising program content and with entertainment program content.

10. The preference engine according to claim 8, connected to receive from the head-end metadata describing advertising content and metadata describing entertainment program content, and programmed to establish content preferences by combining metadata information with the contextual transition behavior profile, and to build a relational knowledge base with associations between the user's behavior, demographics, and program content preferences.

11. The preference engine according to claim 8 programmed to model patterns of usage behaviors with a behavioral model and to extract key usage information from the behavioral model into a behavioral database, wherein each entry in the behavioral database has a confidence value associated therewith reflects an estimate of a structural and sampling quality of the data used to calculate the database entry.

12. In a program content delivery system having a head-end side and a client side, a system for targeted program delivery, comprising:

a central data system at the head-end side receiving viewing data selected from the group consisting of watch data, watch start time, watch duration, and watch channel, demographic information describing a program user, and an electronic program guide with metadata describing a program content;

a demographic cluster knowledge base acquirer receiving behavioral data of the user and outputting a knowledge base in form of a transition matrix with weight sets, the transition matrix predicting a demographic group of the user; and

a program content generating module providing to the client side streams of program content including advertisements based on the predicted demographic group of the user.

13. The system according to claim 12, which further comprises a realtime feedback link for delivering to said central data system realtime information concerning a user's viewing behavior with click stream data.

14. The system according to claim 12, wherein said demographic cluster knowledge base acquirer is based on a hidden Markov model.

15. The system according to claim 12, wherein said demographic cluster knowledge base acquirer and said program content generating module are software modules each adapted to be stored on a machine-readable medium in the form of a plurality of processor-executable instructions.

16. The system according to claim 12, wherein said demographic cluster knowledge base acquirer generates demographic cluster information of the user in terms of statistical state machine transition models.

17. The system according to claim 16, wherein the state machines are defined in the transition matrix, and the transition matrix contains information of program transitions initiated by the viewer.

18. The system according to claim 12, wherein the transition matrix is one of at least two concurrent transition matrices including a channel matrix and a genre matrix.

19. The system according to claim 12, wherein the transition matrix is a two-dimensional matrix with transitions from television channels to television channels in temporal form.

20. The system according to claim 12, wherein said demographic cluster knowledge base acquirer is configured to parameterize the user's behavior with a double random pseudo hidden Markov process, and to define a low-level statistical state machine modeling a behavioral cluster and a top-level statistical state machine with active behavioral clusters and an interaction between the active behavioral clusters.

21. The system according to claim 12, wherein said demographic cluster knowledge base acquirer is configured to define a double random process with a plurality of dimensions, and to determine parallel statistical state machine transition events in at least two of three state categories including channel, genre, and title of the program content.